



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Letter to the Editor

Possible beneficial role of throat gargling in the coronavirus disease pandemic

Recently, research in Hong Kong has shown that patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) had the highest salivary viral load in the oropharyngeal saliva swab sample during the first week, especially on day 4.¹ German researchers found that infected patients could be identified through throat swab tests on the first day of the symptom onset, with symptoms often being very mild or prodromal.² Within the first week after infection, the viruses in the oropharynx and throat were the ones that most actively replicated. Initially, no virus was detected in feces. In addition, the genome sequence of the virus isolated from the throat was different from that isolated from the lung of the same patient. Therefore, SARS-CoV-2 is suggested to exhibit tropism for the tissues of the throat.

Taiwan experienced a SARS outbreak during which the importance of wearing masks was emphasized, which could reduce the amount of virus inhaled, thereby reducing the initial viral load. Therefore, the mask policy was implemented early in Taiwan during the current pandemic, and this has resulted in a relatively lower number of coronavirus disease 2019 (COVID-19) cases. However, several countries have high numbers of COVID-19 infection and deaths, especially owing to the shortage of masks and medical protection equipment. In the current COVID-19 pandemic, the most suggested personal protection habits include wearing masks, washing hands frequently, and maintaining social distance. For the general and high-risk populations, including medical staff and people who are in quarantine, development of new preventive measures to reduce the incidence or at least the disease severity of COVID-19 is urgently needed. One study from China showed that the higher SARS-CoV-2 RNA load in the nasopharynx was related to the severity of the disease.³ Reducing the amount of virus in the body tissue at the initial stage of infection might positively influence the course of the disease. In addition, SARS-CoV-2 has the characteristic of initial throat tropism. Thus, throat gargling, an ancient therapeutic method, might be potentially useful in controlling the COVID-19 pandemic.

A randomized trial study in Japan showed that throat gargling with tap water 3 times a day significantly reduced the incidence of upper respiratory tract infection (UTRI) by 36%.⁴ Another randomized trial study in England showed that nasal cavity irrigation and throat gargling with hypersonic saline during 48 h after the symptom onset in patients with UTRI significantly reduced the period of illness by 1.9 days, the use of medications by 36%, household contact transmission by 35%, and the viral load significantly.⁵ The possible reasons for the effectiveness of throat gargling may be

that the physical washing agent used in throat gargling causes the shedding of the virus and infected cells or causes the chemical inactivation of the virus. The concentration of chlorine in tap water in Japan reaches >0.1 mg/L and up to 0.5–0.8 mg/L in some areas, which is enough to ensure inactivation of the virus. Chloride ions in hypertonic saline have been shown to inhibit virus replication and are used by cells to produce hypochlorous acid to exert antiviral effects. Although throat gargling with chloride solutions has positive results, further large-scale studies are needed to determine the chloride concentration and gargling frequency. As the cost of throat gargling with tap water or saline is inexpensive and almost free, the social and economic benefits of reducing UTRI might be huge.

Although throat gargling helps to clean the mouth and throat, still no method has been developed to clean the respiratory tract. In addition, currently, no evidence has been found to help eliminate COVID-19. For patients with hypertension and kidney disease, ingestion of excessive saline should be avoided. People with abnormal swallowing reflexes should also avoid gargling to prevent unexpected choking and aspiration pneumonia.

Throat gargling could reduce the viral load in the throat of patients with UTRI. Although it cannot eradicate the virus, it can reduce the viral load in the oropharynx. SARS-CoV-2 shows tropism for the throat tissue, which is associated with disease transmission and severity. No effective antiviral treatment has been developed yet. Throat gargling habits with tap water or saline might be suggested for high-risk populations of quarantined people and medical staff. Throat gargling, which is virtually a cost-free modality, might benefit the general population during the current COVID-19 pandemic.

References

1. To KK, Tsang OT, Leung WS, Tam AR, Wu TC, Lung DC, et al. Temporal profiles of viral load in posterior oropharyngeal saliva samples and serum antibody responses during infection by SARS-CoV-2: an observational cohort study. *Lancet Infect Dis* 2020;**20**:565–74.
2. Wolfel R, Corman VM, Guggemos W, Seilmaier M, Zange S, Muller MA, et al. Virological assessment of hospitalized patients with COVID-2019. *Nature* 2020;**581**:465–9.
3. Liu Y, Liao W, Wan L, Xiang T, Zhang W. Correlation between relative nasopharyngeal virus RNA load and lymphocyte count disease severity in patients with COVID-19. *Viral Immunol* 2020. <https://doi.org/10.1089/vim.2020.0062>.
4. Satomura K, Kitamura T, Kawamura T, Shimbo T, Watanabe M, Kamei M, et al. Prevention of upper respiratory tract infections by gargling: a randomized trial. *Am J Prev Med* 2005;**29**:302–7.

5. Ramalingam S, Graham C, Dove J, Morrice L, Sheikh A. A pilot, open labelled, randomised controlled trial of hypertonic saline nasal irrigation and gargling for the common cold. *Sci Rep* 2019;9(1):1015.

C.-L. Tsai

*Department of Dentistry, Kaohsiung Chang Gung Memorial Hospital
and Chang Gung University College of Medicine, Kaohsiung, Taiwan*

P.-C. Wu*

*Department of Ophthalmology, Kaohsiung Chang Gung Memorial
Hospital and Chang Gung University College of Medicine, Kaohsiung,
Taiwan*

* Corresponding author. 123, Da-Pi Road, Niao-Song District,
Kaohsiung, 88301, Taiwan. Tel.: +886 7 7317123x2801; fax: +886 7
7352775.

E-mail address: wpc@adm.cgmh.org.tw (P.-C. Wu).

20 May 2020

Available online 3 June 2020